TECHNICAL SPECIFICATION

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Petroleum, petrochemical and natural gas industries — Guidelines on competency management for well operations personnel

Industries du pétrole, de la pétrochimie et du gaz naturel — Lignes directrices sur la gestion des compétences du personnel d'exploitation des puits

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html

This document was prepared by ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries.*

This second edition cancels and replaces the first edition (ISO/TS 17969:2015), which has been revised to incorporate the agreed changes that were mistakenly not taken into account in the publication of the first edition.

Petroleum, petrochemical and natural gas industries — Guidelines on competency management for well operations personnel

1 Scope

The purpose of this document is to help members of the oil and gas industry develop, implement, maintain and improve their own competency management systems (CMS) for well operations personnel. This document supports competency management general principles which can be applied to any operation within the industry.

The annexes to this document list example competence profiles for personnel responsible for well integrity. Annex A includes an example worksheet which can be used in performing a competency assessment, to help record the assessment results versus expectation, as well as the resulting action plan to address any gaps identified.

This document is applicable to all operators, service companies and drilling contractors working on wells and well operations.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
competence
ability to undertake responsibilities and to perform activities to a recognised standard on a regular, repeatable basis

Note 1 to entry: Competence is a combination of knowledge, practical and thinking skills, and a person's behaviour.

Note 2 to entry: Standards may be company specific.

EXAMPLE 1   McCoy's Law: competency = knowledge × skills × behaviours.

EXAMPLE 2   Bloom's taxonomy: competency = knowledge × skills × (technical + ability).

3.2
competence assessment
process of judging evidence of an individual's performance against agreed competence requirements

Note 1 to entry: The result of such an assessment, potentially in combination with other factors such as work experience, will determine whether that individual has demonstrated competence and to which proficiency level.

3.3
competency catalogue
hierarchical structured list of the competencies required to perform any task

3.4
competency profile
skills and behaviour, each specified at a level of proficiency, required to perform the role or activity in line with the associated risk

3.5
contractor
non-staff member

3.6
independent assessor
approved assessor that utilizes specified objective evidence of competency to assess an individual's skills

Note 1 to entry: The independent assessor shall be an approved individual competent in assessing one's skills based on predetermined and specified objective evidence of competence. This includes, but is not limited to, assessment and debrief techniques as well as competence in the skills being assessed.

Note 2 to entry: The independent assessor may not be the line manager or the direct supervisor of the individual.

Note 3 to entry: The independent assessor may or may not be from within the same company.

Note 4 to entry: Independence needs to be demonstrated to ensure that a balanced and fair assessment of a person's competency in the subject is completed.

Note 5 to entry: If no one at wellsite can fulfil the role of independent assessor, it is recognized that there may be challenges to have extra personnel at wellsite. Therefore, companies needs to leverage modern technology, simulation, remote monitoring, etc. in order to perform independent assessments.

3.7
major accident
significant emission, fire or explosion resulting from uncontrolled events

3.8
proficiency level
level of ability and behaviour attributes within a specific skill

3.9
rubric
set of assessment criteria used to describe and evaluate the important components of a task

Note 1 to entry: A rubric is an effective assessment tool, because it allows different assessors to arrive at similar conclusions when comparing performance to the guidelines shown on the rubric.

3.10
safety-critical competency
type of competence required of personnel in order to carry out an operation which, if carried out incorrectly or inadvertently, can lead to a major accident hazard

3.11
safety-critical task
task performed on a safety-critical element which, if performed incorrectly due to lack of technical skills or knowledge or due to behaviour attributes, can lead to a major accident hazard

4   Competency management system

4.1   General

The purpose of a competency management system (CMS) is to control, in a logical and integrated manner, a cycle of activities within the organization that systematically and consistently promotes the development, assurance and maintenance of competent operations personnel, particularly in safety critical activities. The CMS will enable personnel to be assessed and further developed, contributing to the goal of competent performance at work. A CMS should be user-friendly, workable, auditable and practical.

If an organization has no CMS, the recommended first step is to garner support from the very top of the organization. The system should then be constructed, involving resources from multiple levels of the organization, to create a sense of ownership.

This document contains a number of examples of competency profiles which can be useful for an organization if it has to create profiles for its own staff.

4.2   Benefits of a CMS

An effective, appropriate CMS provides the following benefits:

— assists with compliance with regulatory requirements;

— provides a continuous performance improvement tool for the work force;

— provides a more comprehensive picture of the requirements for a job than a job description alone;

— provides an accurate development analysis, enabling targeted and effective development opportunities;

— provides a measure to calculate the success of training and development interventions;

— provides a framework for ongoing coaching and feedback;

— provides the measurement of proficiency in a specific competency;

— provides a measure of an individual's readiness for a role;

— helps in optimizing training resources and efforts targeting critical skills/competence requirements;

— provides an audit trail of competency assurance.

4.3   Comparison of a CMS with an appraisal system

Performance appraisals generally fall short of the rigour of a competency framework, and therefore are typically not sufficient in isolation to provide a true measure of competence. However, in more recent times many organizations have tried to move to a more competency-based appraisal system in order to provide a more specific measure of performance.

Some key differences between performance appraisals and competence assessment are summarized in Table 1.

Table 1 — Comparison of performance appraisal and competence assessment

Performance appraisal	Competency assessment
Carried out by the line manager or supervisor	Carried out by a competent independent assessor
Subjective measure often based on opinion	Objective measure based on evidence
Measured against high level work areas often focusing on soft skills	Measured against defined standards of competence
A measure of attitude and general performance	A measure of skills, knowledge and behaviour
Quality of judgements rarely verified	Quality of judgements routinely verified

4.4 Development of a CMS

4.4.1 CMS cycle

The main steps or phases by which a CMS can be established, implemented and maintained follow the traditional quality cycle of 'Plan-Do-Check-Act'. These are illustrated in Figure 1 and described in subsequent clauses.
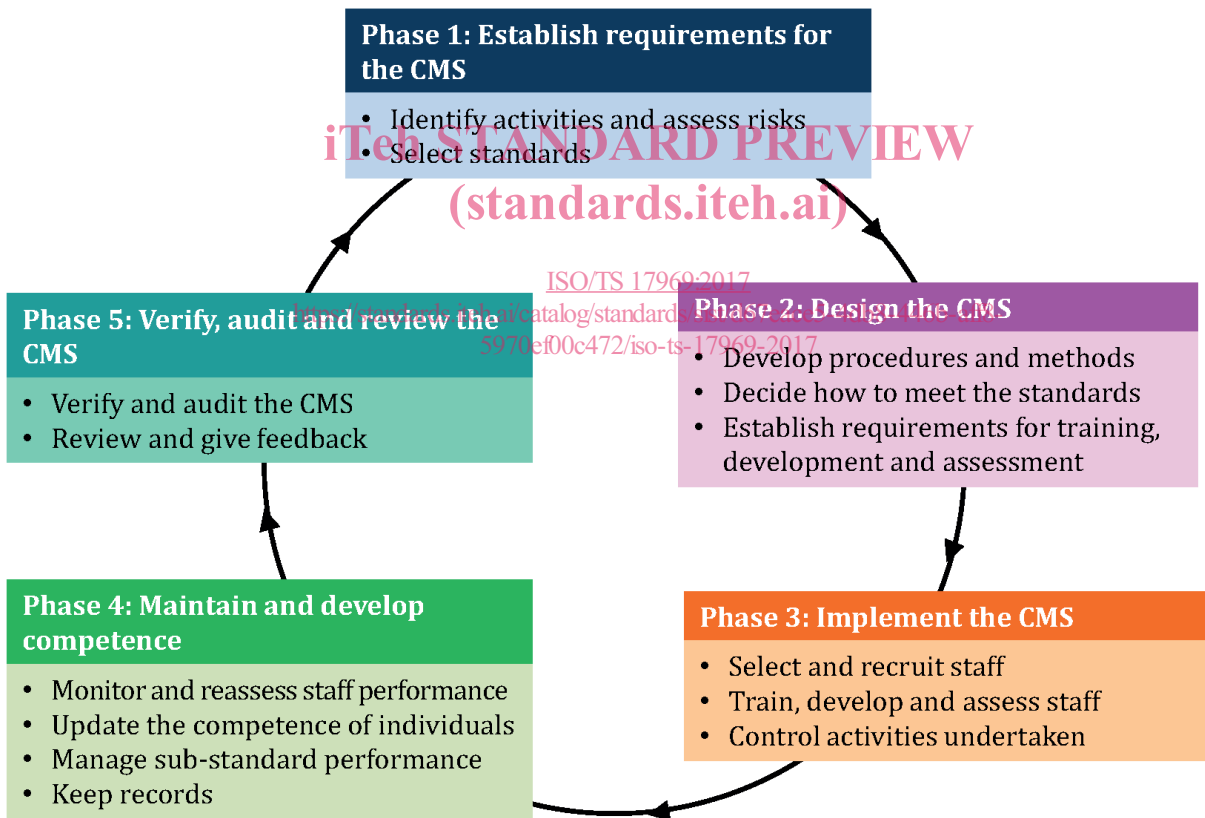

Figure 1 — Competency management system cycle

Establishing a CMS 'from scratch' involves starting with Phase 1. However many organizations can already have some, if not all, elements already in place and so can commence at Phase 5 with a review/audit of the CMS, incorporating this guidance as reference.

For application to operational activities and personnel, the following key elements of an effective CMS have been identified within each relevant phase. Within this document, reference is made to specific guidance in these areas:

a) definition of appropriate competency profiles, skills at specified proficiency levels required for operational activities;

b) assessment of personnel and their individual competences;

c) assessment of operational teams and their collective competence;

d) assessment of contract personnel;

e) recommendations for management of assessed shortfalls, gaps in competency, and subsequent development;

f) recommendation for a system for the storage, management and verification of the collected information in a CMS.

4.4.2 Phase 1 — Establish requirements for the CMS

4.4.2.1 General

Best practice for CMS dictates that the system is tailored to manage the competencies involved with the organization's particular work activities, in proportion to the assessed risks. Nevertheless, it is possible to identify common considerations for a successful CMS.

These best practices are as follows.

a) Description of the CMS in a 'stand-alone' controlled document, which forms a part of an organization's management system. Through the inclusion in the management system, the intent is that the CMS is periodically verified through standard processes.

b) A clearly identified system 'owner', also with responsibility for the overall management system if possible, ensures the CMS is maintained.

c) Clear identification of individual accountabilities for implementation and maintenance of the CMS helps ensure that the system is effective.

d) Time-bound (expiration of) competence proficiency levels ensure that an individual's competency is current.

4.4.2.2 Responsibilities

Identification of suitable competence is the responsibility of management. The employer should ensure that the employee is competent for the tasks which the employer assigns. For this reason, an organization should ensure that its CMS is integrated into the management system as well as their operational methods throughout all levels. Personnel have the responsibility to develop, maintain and demonstrate the required competency for the role they perform.

Employers are required to provide information, instruction and training for their employees and contractors. This includes defining the format and content of competence profiles and standards to be met by employees and contractors, in order to competently perform their roles. The employer should ensure the competence of their personnel, as a part of the CMS, to ensure that the person can perform their work.

Employers are responsible for keeping records of training, certification, work experience and assessment of their employees. Personnel shall also take responsibility for developing and demonstrating their competence.

One critical area of management support is to ensure that personnel are given sufficient time to fulfil the requirements of the CMS. This means there is no expectation for personnel to complete the competence development and assessment tasks during their time off. Sufficient time should be allowed for within their workload.

In accordance with the assessed risk of a task or skill, a period of validity of a specific competence should be specified by the CMS. Thus, the organization is responsible to clearly document the criteria for retention/re-validation, in line with the risk associated with the skill.

4.4.2.3 Key success factors

The most successful CMSs exist where competence is at the core of an organization's operating culture, and the system is a part of the integrated management system. It is important that senior management endorse and drive the CMS with the usage of the CMS supported and encouraged throughout all management levels and departments.

One key to success is to clearly distinguish the population and activities covered by the CMS, for example safety-critical tasks only.

The development of a competence policy, or the inclusion of a commitment to competence assurance in other high level policies, can also provide a solid backbone for the system. The CMS works best if tailored to the organization, ensuring adherence to the operating culture as well as the risk and safety measurement for the tasks being carried out by personnel assessed under the system.

A clear line of sight from policy to the practice of competence management throughout operations is of the utmost importance to the success of the system. Ownership of the CMS is critical, especially for those carrying out key tasks within the CMS, such as assessment and verification. Equally important to success is that the population covered by the CMS embraces and understands the value of the system. The demonstration of competence should not detract from the task at hand, and should not become a job in its own right.

4.4.2.4 Risk-based approach

A CMS should address critical competencies commensurate with operational risk, consequence and complexity. Operators, service companies and rig contractors, including employers, self-employed persons and installation owners/operators, should assess the risks of their operations and identify critical tasks and risks. These risk analyses should underpin the eventual CMS, ensuring that at a minimum safety-critical tasks, those related to asset integrity through the asset life cycle, are covered by the system.

For organizations operating across a variety of asset types and environments, the CMS should take into account the full scope and range of the activities when requirements are established. For organizations operating within a more limited range of asset types and environments, it can be beneficial to define requirements that are 'fit-for-purpose' for specific work programs.

Some roles included in the CMS also carry business, HSE and relationship risks, and the inclusion of associated competencies can be considered. However, care should be taken to ensure that the CMS does not become complex and cumbersome; trying to encompass all potential variables will result in a system burdensome to operate, quickly becoming obsolete.

4.4.3 Phase 2 — Design the CMS

When designing the CMS, an organization should identify their particular activities, the processes to enable these activities, according to the risk assigned by the organization, and the activities to be included in the CMS, which is documented in a controlled management system.

Key stakeholders should be involved in the CMS design. Once completed, the CMS and its fundamental objectives should be clearly communicated across the organization.

A key decision is the extent to which the CMS is to be integrated within any existing human resources (HR) processes for recruitment, performance appraisals, training and development, etc. Depending on the nature of a particular organization's HR and management system, it can be appropriate to establish a CMS that is managed separately from the HR process, but which makes reference to beneficial and contributory elements of those systems.

The overall training and development requirements should be described within the CMS.

Critical elements of the CMS design, specifically related to operations, which should be clearly addressed in this design phase include the following.

a) An identified overall process 'owner' for the CMS, to whom comments, observations and requests for change can be addressed.

b) Assignment of accountabilities for implementing the CMS. This should include specific accountabilities for the technical authorities, as defined in the organization's management system and for line management.

c) The process and responsibilities by which appropriate competency standards for activities are defined and maintained in the organization. This should be assigned to the technical authorities, as defined by the organization's management system.

d) The process and responsibilities for assessment of personnel and their individual competencies.

e) The process and responsibilities for assessment of each operational team and their collective competence. The CMS should be designed to provide line managers with assurance that the collective competence of all assigned teams is appropriate to the specific planned activities and their associated risks.

f) The process and responsibilities for the managing and developing of means to address assessed shortfalls in competency, for both individuals and teams.

g) The process and responsibilities for the competence management of contractors should be specifically set out within the CMS.

h) Data protection issues.

The CMS can identify levels of competency (proficiency levels), such that individuals can undertake the tasks with varying levels of supervision. Individuals can then gain the additional experience, assessment and training as required by the CMS in order to progress their proficiency level. Individuals may be mentored by more competent individuals. Recent organization recruits or contractors might be assigned provisional levels of competency. This status would allow for supervision and/or mentoring, for a defined probationary period, after which their competency can be reviewed.

4.4.4 Phase 3 — Implement the CMS

A CMS implementation program should be defined and agreed by all parties responsible for its effective implementation. When developing the implementation schedule, the organization should review the following factors:

a) the coverage of (and resulting requirement to merge or integrate with) any existing CMS;

b) the operations program;

c) any required synchronization with other management systems;

d) formal management of change (MOC) process for implementation.

Review of these factors can require a staged approach for implementation. In any case, the implementation program should define milestones and measures, to ensure that the status can be clearly communicated and understood by all concerned. There is a specific need to elevate the

importance of communication and understanding by all when rolling out a CMS. There is also a need to develop and execute a well-designed MOC process to explain and gain support.

Once implemented, both employees and contractors should be assessed as soon as practical, per the risk level involved with each role.

If gaps are identified in an assessment, ensure that there is sufficient provision for competency development and/or training for individuals.

4.4.5 Phase 4 — Maintain and develop competence

4.4.5.1 General

Maintaining and developing competency are key objectives of a CMS. Competency is verified through the auditable competency record and validation appropriate to the risk level associated with the skill.

Responsibility should be assigned within the CMS to individuals and their supervisors respectively for the continual maintenance and monitoring of competency.

The CMS should define minimum periods for the conducting of formal competence assessments. Each particular competence should be risk assessed against the knowledge, skills and behaviour associated with that particular level of proficiency. Formal and auditable records shall be maintained of all assessments.

4.4.5.2 Competency record

The organization should keep auditable competency records, which comprise:

a) degrees and other educational records;

b) training records and certificates;

c) presentations (internal or external papers);

d) verifiable/attested work experience;

e) assessments.

The organization may set minimum standards for each type of position to ensure sufficient minimum knowledge.

4.4.5.3 Competence assessment

4.4.5.3.1 General

The quality of any assessment lies in the skills of the assessor and in his/her understanding of the concepts and principles of a competence-based assessment. It is important that individuals responsible for carrying out assessment are trained and qualified in assessment and effective debrief techniques.

Equally important is a uniform methodology for performing and scoring an assessment, to ensure assessments are performed to the same criteria globally across an organization. Every assessment should be performed to a standard template. Grading rubrics should be created to ensure consistent scoring of the assessment. These rubrics should be periodically evaluated and updated to reflect any changes to the competence to be evaluated or the competency assessment tool or method.